Olives

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Scientific Name and Introduction: A member of the Oleaceae family (*Olea europaea* L.), it is a small tree native to the eastern part of the Mediterranean region. The ancient Egyptians, Greeks, Romans and other Mediterranean nations cultivated olives for their oily drupes. The part used for consumption is the fleshy mesocarp, from which edible oil is extracted, or fruit may be pickled and the mesocarp and exocarp eaten.

Olives are a drupe, botanically similar to cherry and other stone fruits. It consists of carpel, and the wall of the ovary has both fleshy and dry portions. The skin (exocarp) is free of hairs and contains stomata. The flesh (mesocarp) is the tissue eaten, and the pit (endocarp) encloses the seed. Fruit shape, size and pit size and surface morphology vary greatly among cultivars.

Quality Characteristics and Criteria: *Green olives*: color, free of mechanical damage, shriveling, surface blemishes, scale and other insect injury, and decay. These are processed according to California black-ripe style or Spanish green style fermented olives. *Black olives*: color, freedom from defects and oil content (12 to 25% depending on cultivar). These are processed (Greek or Italian style) or used for oil extraction.

Horticultural Maturity Indices: *Green olives*: size and color (even coloration, pale green with a minimum of whitish spots (lenticels) through a straw color. An olive is considered mature if it exudes a characteristic white juice when squeezed. *Black olives*: skin color and removal force is used. Fruit reach this stage 3 to 4 mo after the green stage.

Grades, Sizes and Packaging: Harvesting olives represents 50 to 70% of the total production labor cost and 30 to 40% of the gross returns from the crop. Harvested fruit begin to lose moisture immediately. When harvested during hot, sunny weather, olives should be put in the shade while waiting to be hauled away. Sun-exposed fruit get sunburn and will grade as culls. Rough handling causes bruises and grade reduction.

A few growers harvest their fruit mechanically, using tree shakers and catching frames. The use of mechanical harvesting is likely to increase in the future. Olives are harvested for pickling in California from mid-September to mid-November depending on cultivar, local conditions, and needs of the canneries. Optimum harvesting time is determined by the color and texture of the olive. Over-mature or badly bruised fruit frequently spoils during processing. To get the best return, fruit should be delivered to the cannery as soon as possible after harvest.

Optimum Storage Conditions: Olives should be stored at 5 to 7.5 °C (41 to 45.5 °F) with 90 to 95% RH; temperatures < 5 °C (41ºF) cause chilling injury of fresh olives.

Controlled Atmosphere (CA) Considerations: Optimum CA is 2 to 3% O_2 + 0 to 1% CO_2, which delays senescence and softening for up to 12 weeks at 5 °C (41ºF) and 9 weeks at 7.5 °C (45.5 °F). O_2 < 2% can cause off-flavors. CO_2 > 5% may increase severity of chilling injury if olives are stored below 7.5ºC (45.5ºF). The above information is for fresh green olives; fresh black olives should be processed as soon after harvest as possible. But, if necessary, black olives can be kept in 2% O_2 at 5 °C (41 °F) for up to 4 weeks.

Chilling Sensitivity: Olives are sensitive to temperatures < 5 °C (41 °F). Symptoms in 'Ascolano,' 'Manzanillo,' 'Mission,' and 'Sevillano' fruit are a slight, tannish to brown discoloration which develops in the flesh adjacent to the pit. Over time, the discoloration becomes more intense and progresses through the flesh into the skin, at which time the olive has the appearance of having been boiled.

Chilling injury becomes visible on olives stored for > 2 weeks at 0 °C (32 °F), 5 weeks at 2 °C (35 °F), or 6 weeks at 3 °C (38 °F). The order of susceptibility to chilling injury, from most to least susceptible is: 'Sevillano' > 'Ascolano' > 'Manzanillo' > 'Mission.'

Rates of Ethylene Production and Sensitivity: Green olives produce < 0.1 μL kg^{-1} h^{-1} and black olives 0.5 μL kg^{-1} h^{-1} at 20 °C (68ºF). Although olives produce very little ethylene, they are moderately sensitive to ethylene > 1 μL L^{-1}, which causes a loss of green color and flesh firmness.

Respiration Rates:

Temperature	mg CO_2 kg^{-1} h^{-1}
5 °C	10 to 20
7.5 °C	16 to 24
10 °C	24 to 32
20 °C	40 to 80

To get mL kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day.

Physiological Disorders: Nailhead is characterized by surface pitting and spotting. It results from death and collapse of epidermal cells, creating air pockets underneath fruit skin. Symptoms are observed on olives kept at 10 °C (50 °F) for > 6 weeks or at 7.5 °C (45.5 °F) for > 12 weeks.

CO_2 injury is evidenced by internal browning and increased decay incidence and severity. It results from exposure to > 5% CO_2 for more than 4 weeks.

Postharvest Pathology: Postharvest diseases occur if olives have been chilled at temperatures below 5 °C (41 °F), mechanically damaged, not cooled promptly after harvest to 5 to 7.5 °C (41 to 45.5 °F), or exposed to undesirable atmospheres (> 5% CO_2 and/or < 2% O_2).

Quarantine Issues: Since olive fruit fly (*Bactrocera oleae)* is present in many California olive-growing areas, a limited import of fresh olive is carry out from Mexico and Argentina. A very limited export occurs to Canada. These exported and imported fresh olives are not fumigated with methyl bromide.

Issues associated with exotic pest quarantines, either addressing imported or exported fresh olives can change rapidly. APHIS issues rules regarding import requirements. This agency provides information to assist exporters in targeting markets and defining what entry requirements a particular country might have for fresh olives. APHIS, in cooperation with the State plant boards, developed a database called Excerpt to track phytosanitary requirements for each country. APHIS provides phytosanitary inspections and certifications that declare fresh olives free of pests to facilitate compliance with foreign regulatory requirements.

Suitability as Fresh-cut Product: Fresh olives are not edible or suitable for a fresh-cut product.

Special Considerations: Olives for pickling are harvested either unripe, in which case they remain green, or ripe, when they are purple and turn black during pickling. Olives for oil extraction can be harvested from the straw-color stage through the black-ripe stage.

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